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Identifying the Enablers, Intermediaries, Experiences and Responses: A Virtual Reality Conceptual Framework for Sustainable Tourism Development

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Abstract

This study presents a novel conceptual framework to understand the adoption of Virtual Reality (VR) by the tourism industry. Using Diffusion of Innovation (DoI), Technology Acceptance Model (TAM), and Unified Theory of Acceptance and Use of Technology (UTAUT) as guiding theories, the proposed framework is structured across four key stages: Drivers, Intermediaries, Lived Experiences, and Responses. At the Drivers Stage, bottom-line foundational factors, such as Technological Innovativeness, Quality Content (QC), and Cultural Compatibility (CC), are suggested in order for the VR to be embraced and adopted effectively. At the Intermediaries Stage, Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Effort Expectancy (EF), Environmental Condition (EC), and Facilitating Conditions (FC) are suggested to further elevate the lived experience. The interplay of experiential and socio-cultural factors suggested as moderators strengthens the VR learning outcomes of the individuals. The Lived Experience stage captures the true interaction of the users with VR technologies in order to understand how experiencing VR technologies can influence user perception. Finally, the Responses Stage represents the VR adoption outcomes via user Behavioural Changes (BC), Willingness to Sacrifice (WS), and Destination Loyalty (DL). These experiential outcomes additionally suggest the application of VR technologies as an alternative to conventional tourism activities. Overall, the proposed VR tourism framework serves as a guiding roadmap by offering strategic insights coupled with working mechanisms for key tourism industry stakeholders such as tour operators, tourists, and tourism authorities. Particularly, the framework offers how VR-enabled trends and innovations can augment tourist experience and reshape the overall tourism industry, particularly in developing economies.

Keywords

Sustainable Tourism; TAM; UTAUT; VR tourism; Lived experience; VR sestination loyalty; SDGs

Introduction

In recent years, digital technologies and innovation have become increasingly significant elements in tourism in terms of enabling augmented visitor experiences and improving overall tourism operational efficiencies (Prados-Castillo *et al.*, 2023). Virtual Reality (VR) is one such technologies that enable immersive and interactive experiences for tourists, enabling them to meaningfully explore and enjoy their destinations. The advancements in VR hardware and software have made immersive experiences more accessible and affordable (Li *et al.*, 2024). Moreover, global outrages and crises of the recent past such as COVID-19 pandemic, geopolitical conflicts, trade barriers, war situations etc. have made integration of VR technologies indispensable for the tourism sector, resulting in a need to develop advanced VR tourism models and meet the tourists' preferences towards a safer remote tourism (Talwar *et al.*, 2022). The VR device market has been growing at a rapid pace globally. It has grown from $14.98B in 2024 to $17.42B in 2025. Advancements in VR can be attributed to gaming and entertainment, enterprise applications, education and training, healthcare simulations, etc. The VR market is expected to grow to $28.34B in 2029 (Company, 2025, Mosbeh, 2025). Although the VR technology has been embraced in entertainment, the use of VR has revolutionized many other industries, such as healthcare, workforce development, and manufacturing, by providing more immersive and effective tools to enhance performance and efficiency (Xi and Hamari, 2021; Li *et al.*, 2025a).

The introduction of AI and the Metaverse has transformed the field of tourism into a new dynamic where people can explore real-life experiences virtually (Yang and Wang, 2025). By streaming through the metaverse, a new horizon of tourism can be learned and strategized to explore the industry through a different lens (Rather, 2025). Besides this, the advancements in VR tools by companies like Oculus headsets, Samsung Gearbox, and others have introduced a new dimension to tourism (Gray and Tang, 2025). These VR techniques offer various ways for industry stakeholders to explore new dynamics of the field and enhance their business models through their adoption. Moreover, it can provide a better alternative to culturally, medically, or socially restricted people. People facing obstacles can enjoy various tourist places by adopting VR technology (Kim and Adu-Ampong, 2025). In addition, the current market for the metaverse is valued at $130.5 billion, with projections suggesting it will surge to $1 trillion in the next five years (Statista, 2025). Market Data Forecast analyzed the Global Virtual Tourism Market, which is expected to grow 30.2% in the next eight years. In recent years, it has generated a revenue of about $13.46 billion, which is predicted to register a CAGR of about 30.2% (Forecast, 2025). A study conducted by Cognitive Market Research concluded that the Asia Pacific market dominated the VR Tourism market in 2023, capturing 38% of the total revenue. In contrast, North America leads in the most advanced technology in the tourism industry. Tourism-related industries, including Travel Agencies, Hardware and Software manufacturers, and related tools, are expected to grow significantly shortly (Kumar and Kushwaha, 2025).

While VR tourism can promote cost-effective tourism through a virtual site-seeing experience, thereby helping to reduce the physical influx of visitors and supporting environmental sustainability (Andziak, 2025), yet there are scholarly debates about its application and effectiveness, especially in the cultural and religious settings. Some

researchers have shown concern regarding VR tourism's replacing real travel, affecting the socio-cultural significance of the sites and destinations that rely on physical visits and experiences (Mandić and Walia, 2023). Besides, there are also ethical discussions, especially governing the exhibition of cultural customs and traditions in a virtual environment (Chhabra, 2021). To this end, the conventional religious tourism, which involves visiting the sacred sites, taking part in rituals, feeling the sentiments, and building spiritual connections, such experiences cannot be fully offered by virtual means of tourism (Alkhalifah *et al.*, 2025). Yet another potentially arising concern in the future could be the environmental impact of VR platforms and devices in terms of their sustainable manufacturing and environmentally friendly disposal of the electronic waste (Li *et al.*, 2025b). While these specific examples and cases highlight some controversies amidst a range of potential benefits governing the application of VR technologies in tourism, it is important to further evaluate its adoption and effectiveness by systematically reviewing the key aspects of VR technologies that promote its adoption within the tourism sector such as user acceptance, user engagement, content delivery, service design etc. (Pecheniuk *et al.*, 2025, Chen, Wu and Lai, 2023).

This research thus focuses on recognizing a substantial gap in comprehensively identifying and understanding the effect of underlying sociocultural, experiential, and technological factors on VR tourism adoption (Jiang, Deng and Zheng, 2023). Accordingly, a structured model encapsulating these dimensions is needed to understand the interplay between the above factors. Keeping this in view, this study offers a conceptual VR Tourism framework that integrates sociocultural, experiential, and technological factors that influence the adoption of VR tourism. Identifying these gaps is essential for two reasons. Theoretically speaking, it contributes to the existing VR tourism literature in terms of proposing a novel conceptual framework that highlights key enablers, intermediaries, and responses. Practically speaking, it helps VR tourism industry stakeholders such as tourism departments, tour operators, technology vendors, and tourists by offering economically viable, socio-culturally acceptable, and environmentally sustainable mechanisms, aimed at catalyzing the untapped potential of VR in meeting the ever-increasing tourism demands and achieving growth of the global economies.

Literature Review

VR Tourism

VR technology and its uses have entirely changed the world and have brought an era in itself for many fields, especially tourism, one of the foremost fields that has witnessed the upgraded level of use of VR technology (de Lurdes Calisto and Sarkar, 2024). With the maturation of VR, its integration into tourism has become of great interest to academics and the tourism industry, provoking a great deal of research on its practicality, adoption, adoption by consumers, and effect on consumer behaviour (Lee, 2022). There are models for user acceptance of VR, experiential effects of VR, and economic contributions of VR that have been explored in the latest literature regarding VR deployment within the tourism sector, which this literature review critically assesses (Nam, Dutt and Baker, 2023). Three theories were adopted in this study to measure the importance of VR in recent technology.

TAM (Sancho-Esper *et al.*, 2023), its extended version, UTAUT (Huang, 2023), and the diffusion of innovation theory (Raj *et al.*, 2024).

Recently, academic and commercial researchers alike have been looking at how to integrate Virtual Reality (VR) into the tourism industry, where there is potential for VR to transform the tourist experience radically. The theoretical foundations, technological advancements, and empirical studies concerning VR in tourism are explored in this literature review to facilitate an understanding of how it is adopted, what sort of challenges it may encounter, and what outcomes it will generate in the future (Nam, Dutt and Baker, 2023). Several tourism technology acceptance models have been used to study VR adoption in the particular conceptual paper. Understanding how tourists accept VR is important in relocating the VR acceptance paradigm. This study used the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and Diffusion of Innovation (DOI) to discover how various factors affect the approval of VR technologies. A study by Li and Jiang (2023) has shown that multiple factors significantly influence the adoption of VR in tourism settings. In this respect, VR's application value in tourism depends mainly on the extent to which it can simulate 'real' environments. Fussell and Truong (2023) claim that, by using VR, tourists can virtually visit destinations and make travel decisions before visiting the actual destination.

Figure 1: VR Experience (Photo courtesy: Author, 2025s)

Additionally, VR enhances visitor experience via immersive stories and revitalized past eras, adding educational value and further cultural innovations (Nam, Dutt and Baker, 2023). Destinations can attract a larger audience and increase tourism revenue without the related physical site wear and tear by opening virtual access to destinations (de Lurdes Calisto and Sarkar, 2024). VR also offers new marketing opportunities for destinations and service providers to display immersive experiences in travel fairs and online platforms to reach a global audience (Polishchuk *et al.*, 2023). Nevertheless, the

enormous costs of content development and regular technological upgrades present significant hindrances, as classified by (Kim, Shinaprayoon and Ahn, 2022). VR integration into tourism is promising; however, there are some challenges. For many service providers, immersive content development is too complex, and the high cost of VR technology is prohibitive. However, further investigation is required to deepen our understanding of the long-term effects of VR on consumer behaviour and how it might influence traditional tourism practices (Yu *et al.*, 2024).

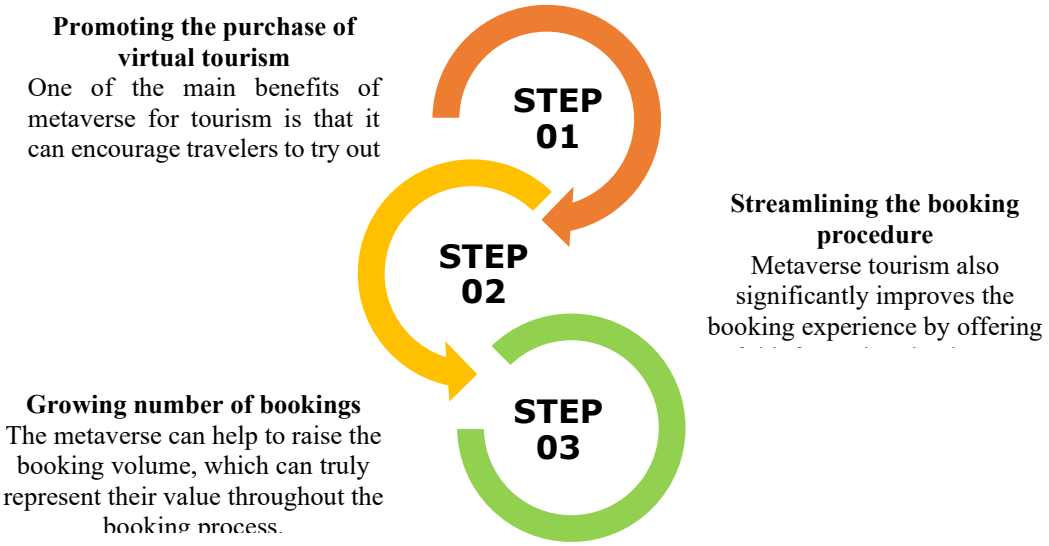
Promoting the purchase of virtual tourism
One of the main benefits of metaverse for tourism is that it can encourage travelers to try out
STEP 01
STEP 02
STEP 03
Streamlining the booking procedure
Metaverse tourism also significantly improves the booking experience by offering
Growing number of bookings
The metaverse can help to raise the booking volume, which can truly represent their value throughout the booking process.

Figure 2: Key Benefits of Metaverse for Tourism (*Source:* Srivastava and Sahu, 2023)

When discussing the Metaverse specifically, the literature is limited, yet its conceptualization seems interesting. In tourism, the concept of the Metaverse is vital, as it will boost the understanding of virtual tourism (Go and Kang, 2023). Travelers may get a different opportunity to enjoy the places virtually. Moreover, tourists can uniquely experience the booking procedures through the Metaverse by adopting it through virtual reality. Not only this, but it will also help to grow the volume of online bookings through an immersive experience of virtual reality. Such inventions lead to the industry's overall growth globally, and the market size will also grow (Buhalis, Leung and Lin, 2023). The analysis shared by the market data forecast shows a continuous development of the global virtual tourism market. Recently, it has shown a bar of $13.46 billion, which is expected to cross $100 billion in the next 8 years with a 30.2% CAGR (Forecast, 2025). These predictions are genuinely based on understanding virtual tourism dynamics in the upcoming years. Some analytics have concluded it even more, as it is all based on technology and how the industry will adopt it in the coming years.

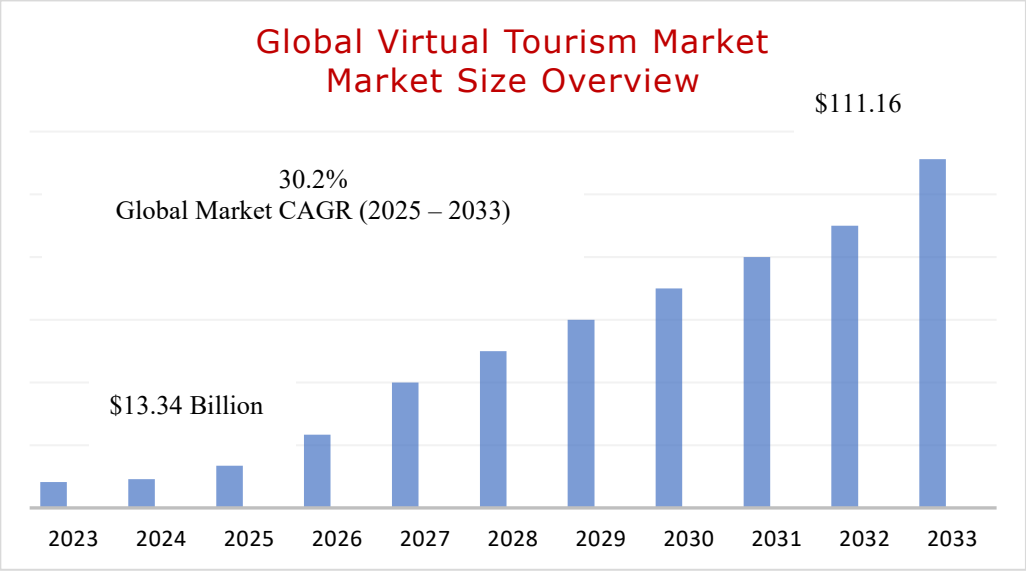

Figure 3: Global Virtual Tourism Market Size (*Source*: Forecast, 2025)

The Guiding Theoretical Frameworks

The research is conceptually grounded on three prior theoretical frameworks: TAM, UTAUT, and DOI. The model is established based on multiple constructs, including PEOU and PU from TAM. Technological innovativeness is taken from the Diffusion of Innovation theory, and social conditions and facilitating conditions are taken from UTAUT.

Technology Acceptance Model (TAM)

Davis, in 1989, introduced TAM, which focuses on understanding and adopting technology. VR in tourism is an area in which TAM's core constructs, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), play a vital role in past studies. Perceived Usefulness is the extent to which a person believes using a system will increase work performance and productivity (Sancho-Esper *et al.*, 2023). However, VR can promote the tourism experience by providing immersive and interactive content. On the other side, Perceived Ease of Use (PEOU) refers to the extent to which a user feels that using a particular technology is free of effort, i.e., they can use it quickly based on limited available knowledge (Bano and Siddiqui, 2024). In VR settings, it is essential that the ease of navigating VR environments can significantly affect how satisfied a user is and how likely the user may be to continue using it. Previous studies have shown that adopting technology enriches experiences and enhances tourist engagement (Bano and Siddiqui, 2024, Iurchenko *et al.*, 2024). Tourists are more likely to use VR if they believe that VR can offer them new, immersive experiences that would improve their knowledge about a destination. Perceived Ease of Use has a similar function: it prevents potential users from being discouraged by technological complexities (Schiopu *et al.*, 2022). Tourists should find VR interfaces user-friendly and easily navigate through these interfaces, which should, in turn, decrease anxiety levels when they use new technologies and thus increase usage (Oncioiu and Priescu, 2022).

Unified Technology Acceptance and Use of Technology Theory (UTAUT)

To enhance earlier acceptance theories, Venkatesh *et al.* (2003) expanded their Unified Theory of Acceptance and Use of Technology (UTAUT) by combining several key constructs that predict user engagement and adoption (de Lurdes Calisto and Sarkar, 2024). Facilitating Conditions and Social Influence were directly borrowed from UTAUT in this study. Meanwhile, reducing conditions are defined as the extent to which an individual believes that the organization and technical infrastructure exist to support the use of the system (McLean *et al.*, 2023), VR devices at tourism spots to ensure that there is technical support for users. Social Influence refers to the degree to which users feel significant others believe they should use VR technologies (Bigne and Maturana, 2023). VR device availability and sufficient tourist destination support are the key facilitating conditions for actual use. The higher the access to VR devices and clear instructions on using them successfully, the more likely it is for VR technology to be adopted VR technology. This finding supports UTAUT's claim that an individual's perception of the presence of infrastructure plays a significant role in technology adoption (Atzeni, Del Chiappa and Mei Pung, 2022). Social Influence also plays an important role. Tourism is a field in which decisions are based on social fads, and travel influencers, friends, and family endorsements play a vital role in driving the adoption rate. The adoption of new technologies, such as VR, by tourists is more likely to occur when we observe others in our network of social relationships (Kim and Hall, 2019, Komilova *et al.*, 2025). Here, we witness normative pressure and mimetic processes often discussed in social theories that study technology diffusion.

Diffusion of Innovation (DoI) Theory

The DOI theory examines how, why, and at what rates new ideas and technology spread. This theory also affects Technological Innovativeness. It assumes that innovation characteristics (e.g., relative advantage, compatibility, complexity, trialability observability) affect the adoption rate (Kim, Lee and Preis, 2020). Technological Innovativeness in VR pertains to how VR technology's newness or extraordinary value is perceived in the tourism industry and whether it offers a significant improvement or distinctiveness towards traditional tourism activities (Chiao, Chen and Huang, 2018). However, Technological Innovativeness can reflect the rapid adoption of VR technology by a wide range of producers and users across the tourism industry (Raj *et al.*, 2024). According to Rogers' 1962 Diffusion of Innovations Theory, people adopt innovations that can be judged as improvements to already offered choices. VR technologies that substantially improve existing experiences (e.g., VR-based travel to remote or inaccessible destinations) will be adopted rapidly in tourism (Fan, Jiang and Deng, 2022). VR novelty and the delivery of unique and memorable experiences have become major differentiators for businesses and consumers who want to invest in VR technology. Additionally, as VR technologies improve and provide more realistic experiences, their adoption is expected to increase, pushed by a more significant relative advantage and market visibility (Elkhwesky *et al.*, 2024).

Methodology

The methodology involves a review and synthesis of prior literature on VR tourism and associated technologies. All the suggested variables in the conceptual model (such as Enablers, Intermediaries, Experiences, and Responses) were identified from the prior literature, with their role substantiated in the given context. In this study, three existing theories were combined through the prescriptive Theory Synthesis methodology provided by (Jaakkola, 2020), aimed at deriving and giving a relevant context to the proposed conceptual framework of VR tourism. The theory synthesis refers to a method of conceptual research that blends existing but unconnected or fragmented theories or constructs to develop new theoretical insights to explain the complexities of a phenomenon (Shi *et al.*, 2018). Therefore, the proposed conceptual framework draws theoretical understandings from the well-known theoretical frameworks such as TAM, UTAUT, and DOI. These theories examine how technology adoption in tourism can influence visitors' tendency to experience and adopt virtual tourism. The theory synthesis process is based on four main steps:

Identification and Selection of Relevant Theories

To identify the relevant theories, an extensive literature review was conducted related to the adoption and acceptance of VR technology in tourism. The process followed the PRISMA approach to ensure a thorough coverage of available literature in the context of VR tourism. A total of 502 studies published during the last ten years (2016 - 2025) were identified from two well-known databases, i.e., Web of Science and Scopus. These studies were searched through keywords including TAN, UTAUT, DOI, VR, and Tourism. After doing an initial screening, 267 studies were excluded as they didn't address technology adoption in tourism-related contexts. The rest of the 235 articles were assessed through their abstracts. Ninety articles were excluded due to unavailability of full text, insufficient focus, and duplication of content. In the end, 145 articles were included in the qualitative synthesis to develop an integrated conceptual framework.

Extraction of Core Variables for the Framework

After finalizing 145 papers, some key relevant variables from these papers were extracted for the framework. After removing the duplicated variables, a total of 20 unique variables were found and subsequently logically assigned to the framework. Moreover, it was also necessary to understand the operational definitions of these variables to ensure whether these were consistent with the proposed concept or otherwise.

Mapping and Integration of the Key Variables into the Framework

After finalizing the key variables, the proposed conceptual framework was developed based on four different dimensions, i.e., Enablers, Intermediaries, Responses, and Experiential and Socio-Cultural Factors. These were contextually aligned and logically linked to ensure comprehensive meaning and understanding within the framework when viewed as a whole.

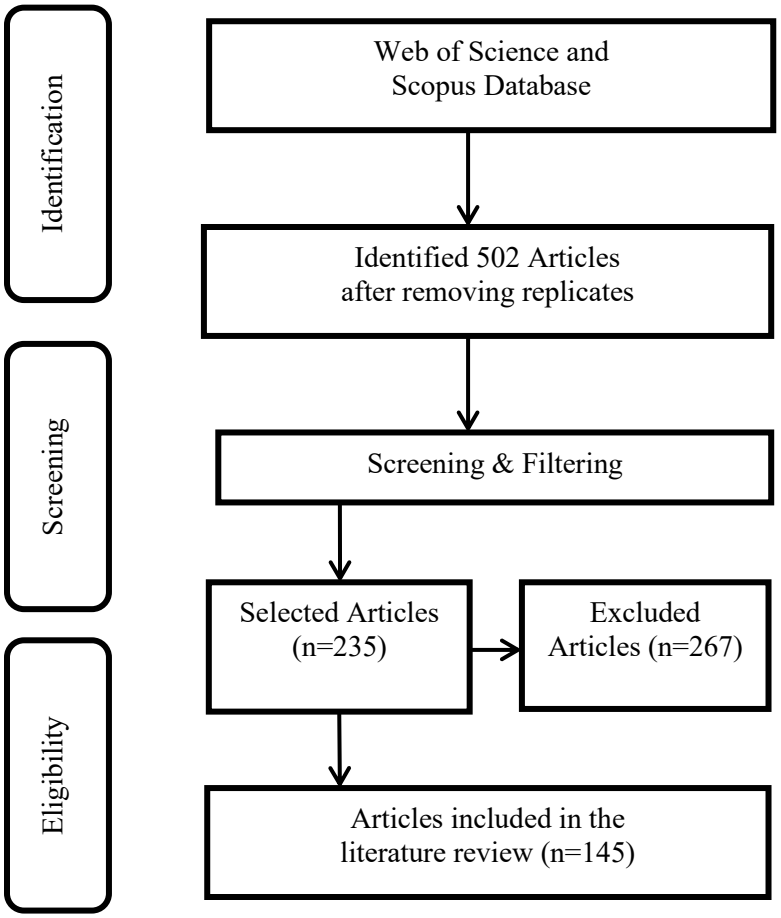

Figure 4: PRISMA Flowchart

Contribution of Identified Variables in the Framework

The underlying theories were compared, linked, and contextually applied in developing a framework comprising four domains. The incorporation of each construct in the framework is backed by the supporting theories by considering their core meaning and relevance towards supporting the adoption of VR tourism. The direction of these constructs was another necessary consideration, which was also backed by the supporting theories and literature. All these processes enabled the development of a comprehensive framework that highlighted the key factors and determinants of VR tourism adoption.

Proposed Conceptual Framework

In order to develop a logically meaningful VR tourism framework, we drew upon three dominant theories (i.e., TAM, UTAUT, and DOI) and considered some relevant socio-cultural, technological, and experiential factors. As can be seen in the framework, technological innovativeness, content quality, and cultural compatibility serve as the Enablers for the Intermediaries, like Perceived Ease of Use and Perceived Usefulness

(adopted from TAM), effort expectancy, Environmental Conditions, and Facilitating Conditions (adopted from UTAUT). These subsequently lead to achieving Lived Experience in VR users, which is subject to an influence by some Experiential and Sociocultural factors and consequently ends up in reflecting user Responses like Satisfaction, Behavioural Changes, Willingness to sacrifice, and VR Destination Loyalty. All the key variables identified in the framework as Enablers, Intermediaries, Experiential Factors, Socio-cultural Factors, and Responses are elaborated here.

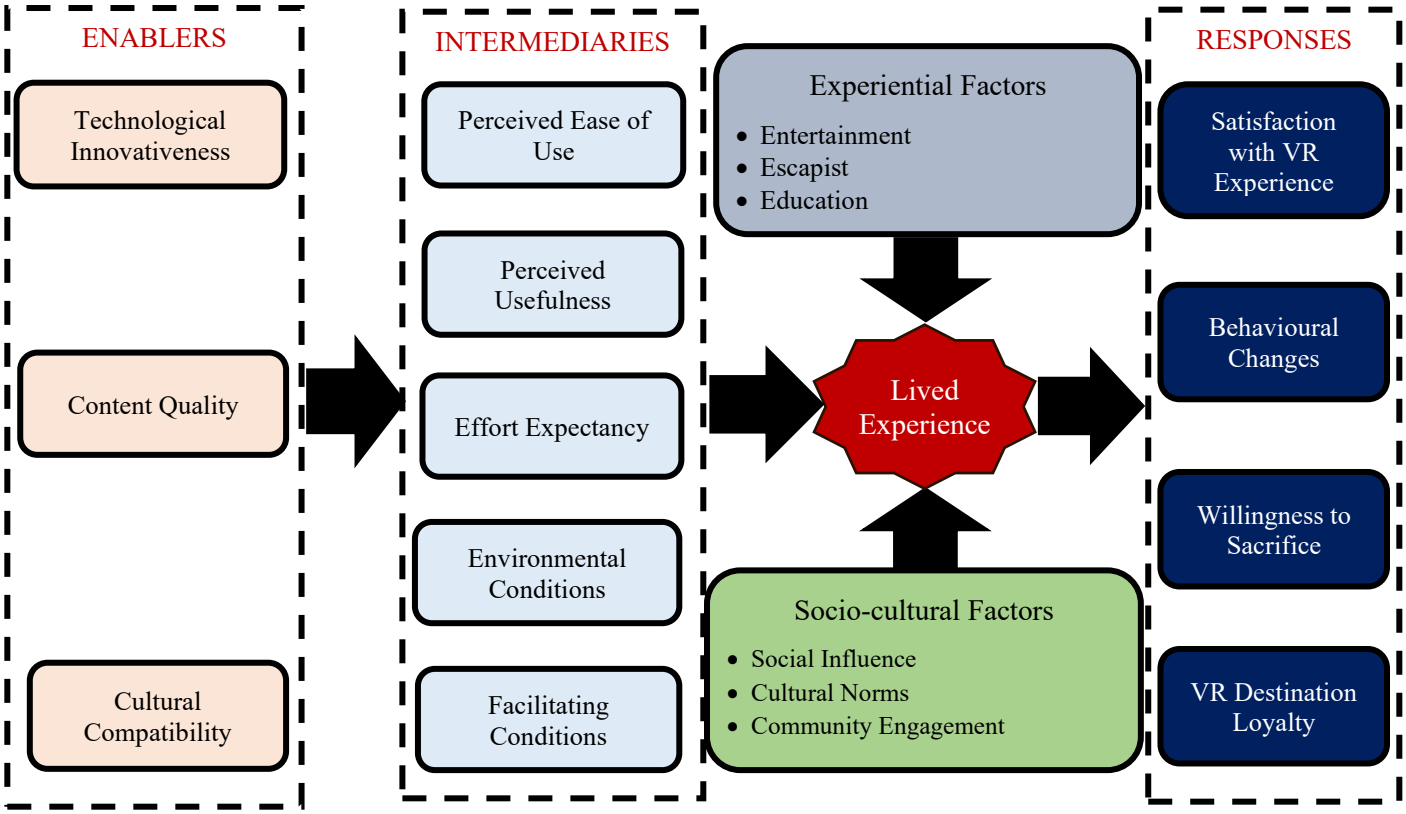

Figure 5: VR Tourism Conceptual Framework

Enablers

Technological Innovativeness

The exploration and curiosity to adopt new technology by an individual or any organization is termed technological innovativeness (Shukla, Rana and Prashar, 2024). It is envisioned that by the DOI theory, the rate of VR adoption in the tourism industry is influenced by factors including relative advantage, compatibility, complexity, trialability, and observability (Alam *et al.*, 2024). It explains that VR minimizes uncertainty by offering real-life experiences, which aligns well with these principles, making it a potential for businesses and travellers (Kaur *et al.*, 2023). However, the diffusion of such a technology is hampered by high costs, a lack of sensory completeness, and limited access, among other barriers (Farzin, Mamdoohi and Ciari, 2023).

Content Quality

Content quality in tourism, specifically in VR, explains high-quality content's effectiveness, immersion, and effective outcomes (Hsiao and Lin, 2023). The content should be high-quality, accurate, relevant, and immersive to give users an authentic sense of the destination. In VR, visuals are lifelike, interactive, and culturally sensitive, which increases their presence and emotional connection to the Experience (Rivera *et al.*, 2023). Low-quality content, whether a low-resolution image or an unrealistic portrayal, can cause distrust and dissatisfaction and stop people from adopting. On the other hand, well-crafted content that inspires emotions and matches user expectations can inspire travel and build trust. With the continued rise of VR in tourism, content quality has become a key element and is more accepted on a broader scale (Ahmad *et al.*, 2023).

Cultural Compatibility

Cultural compatibility measures how closely a product, service, or experience reflects a group's values, practices, and expectations. Cultural compatibility between tourism and Virtual Reality is a primary factor affecting the authenticity and acceptance of virtual experiences (Hsiao and Lin, 2023, Subair, Prianto and Amri, 2025). Academic literature stresses that the content of VR has to precisely and decently present the cultural heirlooms and conventions of purpose destinations without utilizing stereotypes or presenting an amusement of the locales that could reduce its believability or estrange users (Oyewo, 2021). Virtual pictures of cultural festivals, for instance, must accurately represent rituals, dress ways, and symbolic practices to enable the comprehension and acknowledgement of various gatherings. Additionally, a culturally compatible user interface design is extended to language options and culturally adapted symbols for accessibility and engagement (Alam *et al.*, 2024). Issues in cultural alignment failure may not only result in users' dissatisfaction or ethical concerns, but culturally sensitive and accurate content will also promote inclusivity and user acceptance, and enhance the relationship between travellers and destinations. The global diffusion of VR technology requires continuous attention to its cultural compatibility with tourism (Fan, Jiang and Deng, 2022).

Intermediaries

Perceived Ease of Use

The degree to which users understand that using a system or technology is enjoyable and effortless. Drawing on the TAM, this construct is a key influencer on user adoption of such tools as VR in tourism (Schiopu *et al.*, 2022). As the literature points out, user-friendly interfaces, intuitive navigation, and a lack of technical hurdles greatly influence perceived ease of use. In VR tourism, device compatibility must be smooth, which can be accomplished by simplifying the setup process and delivering easy-to-use features, including for users with limited levels of technological literacy (Ortet, Veloso and Vale Costa, 2022). Users' perception of VR systems as easy to use correlates with their engagement with the technology, ultimately resulting in increased adoption, improving their overall experience and satisfaction. However, if systems are perceived to be too complex or cumbersome, potential users will reject them even when they realize the benefits of the systems (Ahmad *et al.*, 2023). Consequently, perceived ease of use

becomes a critical mediator in the diffusion of VR in tourism, thus validating the need to build user-accessible and convenient systems to adopt and use over extended periods (Yu *et al.*, 2024).

Perceived Usefulness

PU refers to the degree to which individuals believe that the technology they are using is procured, measurable, and performance gains are up to the mark. PU is a key determinant of technology adoption in the context of tourism and VR, based on the Technology Acceptance Model (TAM) (Özekici and Küçükergin, 2023). The literature suggests that VR is useful in tourism, providing immersive previews of destinations, reducing decision-making uncertainty, and increasing accessibility for users who cannot be physically present (Vishwakarma, Mukherjee and Datta, 2020). VR can provide value to travellers by providing realistic and engaging immersive experiences that help them plan their trips or learn about the cultural and historical background of places they might visit. Nevertheless, the level of Usefulness of VR is significantly contingent on the quality and relevance of VR content and the context in which it is used (Leung *et al.*, 2023). Users are more likely to adopt and integrate VR technology when they see VR's benefits in meeting their needs or improving their travel experiences. Therefore, perceived Usefulness remains a hallmark of VR's successful implementation and diffusion in tourism (Huang, 2023).

Effort Expectancy

In the UTAUT, effort expectancy is conceptualized as the degree to which a person believes that adopting a particular technology will be facilitated by some properties (YiFei and Othman, 2024). In tourism and Virtual Reality (VR), effort expectancy significantly affects users' acceptance and adoption of VR systems. Academic literature shows that users are more likely to adopt VR if they perceive that it is very easy to operate (intuitive interfaces, seamless navigation, etc.) and even easier to set up (Zhang *et al.*, 2022). Effort expectancy in tourism affects tourists and service providers. If made easily usable for travellers with little technical expertise, these VR applications can create pre-travel experiences, such as exploring destinations or planning travel. VR platforms that are easier for service providers to integrate into marketing or customer engagement strategies increase their efforts to reduce effort expectancy (Kim and Hall, 2019). Adoption can be discouraged, and users can be frustrated by high effort expectancy (such as complicated controls or barriers to technology). Therefore, VR systems are accessible and easily used to promote acceptance and exploit their potential in the tourism industry (Vishwakarma, Mukherjee and Datta, 2020).

Environmental Conditions

In tourism, environmental conditions are not only infrastructural or technological issues, but are also concerned with sustainability, ecocentrism, and the ethics of tourism practices (Zulvianti, Aimon and Abror, 2022, Sai *et al.*, 2025). This highlights the importance of green tourism, which focuses on minimizing negative environmental impacts and promoting sustainable travel. Due to these concerns, eco-guilt has begun to label tourists as responsible for the negative environmental impacts of their travel choices. This gives us

an immersive, environmentally friendly experience compared to physical travel (Rodríguez Enríquez and Bujosa Bestard, 2020). VR tourism helps users experience destinations virtually, without the carbon footprint of typical travel, and allows everyone to experience and immerse themselves in other cultures, landscapes, and ecosystems. The environmental impact of tourism and increased customer demand for sustainable choices are addressed here (Han, Lee and Hwang, 2016). In addition, VR raises travellers' awareness of conservation issues so that people can virtually 'experience' endangered ecosystems and animals, and they will feel a sense of responsibility and help encourage eco-friendly behaviours (Halunko *et al.*, 2024). Consequently, VR has emerged as an innovative tool to meet the growing need for responsible tourism and cure eco-guilt while, more responsibly, exploring a destination (Erdoğan *et al.*, 2022).

Facilitating Conditions

The facilitating conditions include external resources and support systems that facilitate the adoption and use of technology (Wagler and Hanus, 2018). Regarding Virtual Reality (VR) in tourism, facilitating conditions refer to the required technological infrastructure, technical support, and available resources, enabling tourists and service providers to access and use VR applications (Sousa *et al.*, 2023). Access conditions may include quality VR hardware such as headsets and controllers, adequate internet bandwidth for streaming immersive experiences, and training or assistance to help users navigate VR systems. Furthermore, facilitating conditions in tourism also cover organizational support and a broader industry environment (Sousa *et al.*, 2023). For example, tourism companies should invest in VR technology and provide their customers with the support they need for the whole virtual Experience - think of VR travel previews or immersive destination tours. In addition, local technological ecosystems (Ivanyshyn *et al.*, 2022), including skilled personnel and support networks, help the adoption process. However, when these conditions are facilitated, tourists are more willing to participate in VR offerings, which, in turn, enhances their ability to add VR to business operations. If such conditions are absent (i.e., less access to VR equipment or insufficient technical support), these become serious barriers to successful VR spread in tourism (Shukla, Rana and Prashar, 2024).

Experiential Factors

Entertainment

Entertainment is a critical experiential factor of VR tourism, as it directly leads users to undergo VR tourism by having them enjoy and be stimulated by the content they are already engaged with (Geng *et al.*, 2024). With VR, users can experience dynamic and interactive materials such as virtual adventures, simulations of remote destinations, and even leisure and entertainment. In addition, gamified elements, such as interactive tours or challenges, are incorporated to increase entertainment value for those who aim to have fun and find something new anytime they travel (Ying *et al.*, 2022).

Escapist

Regarding experiential factors, escapism is the ability to transfer from an existing reality (or at least existing surroundings) to something interpreted differently (Fan, Jiang and

Deng, 2022). In this way, this quality of immersiveness provides a psychological respite from daily stressors and allows individuals to explore distant destinations, historical settings, or imaginative environments. The VR medium is excellent for users who need to escape, relax, and take a break from the daily routine of life, and by making remote or remote access only possible for users, it is a great facilitator (Talwar *et al.*, 2022).

Education

VR is a profound educational tool in tourism because it allows learners to explore experiential learning. Virtual tourism offers in-depth knowledge of historical and cultural practices and ecological systems through interactive and narrative-based content (Griffin and Muldoon, 2022). When employed as an educational tool, VR allows users to explore and interact with academic content in a highly immersive way, driving greater understanding, cultural awareness, and appreciation, which also contributes excellent educational value to the tourism experience (Polishchuk *et al.*, 2023).

Aesthetics

The aesthetic factors of VR tourism are related to sensory aspects rather than the appeal of virtual environments in terms of visual and auditory quality (Atzeni, Del Chiappa and Mei Pung, 2022). Visualizing landscapes, architectural structures, and cultural heritage in the virtual destination becomes a central feature to increase user experience, making it more impactful and memorable. An integral element of VR tourism is the ability to enjoy staring at artfully arranged objects or appreciating a carefully designed environment (McLean *et al.*, 2023).

Sociocultural Factors

Social Influence

Social Influence refers to the Influence of other individuals, groups, or broader social networks on a person's decisions, behaviours, and attitudes. The adoption and acceptance of virtual experiences in VR tourism are functions of social Influence (Zhu *et al.*, 2024). If people engage with VR technologies, they are likely influenced by the behaviour, opinions, and recommendations of current peers, family members, or someone else with some say in what they do, such as an influencer or travel expert (Mclean *et al*., 2023). Research in technology adoption indicates that social Influence (as expressed through norms and observed behaviours of others) significantly affects an individual's propensity to trial new technologies (Oncioiu and Priescu, 2022). However, only when key figures or groups endorse this can the perceived legitimacy and attractiveness of the technology increase. In addition, these endorsements provide social validation that can decrease uncertainty and improve confidence in adopting VR as a feasible tool for virtual visits to new destinations, leading to the faster diffusion of VR in tourism (Skard *et al.*, 2021).

Cultural Norms

Cultural norms pertain to the shared values practised within a cultural or societal group. Norms influence the acceptance, utilization, and consumption of virtual travel

experiences, affecting how well new technologies align with societal values (Kim, Lee and Preis, 2020). Travelling to a place is considered to authentically engage a destination through a physical act. To attain this, VR can fulfil it as it is detached from real-world Experience (Fan, Jiang and Deng, 2022). In contrast, VR could be accepted and treated as a valuable tool for visiting new places in cultures that are more open to technology and digital experiences. Similarly, how VR tourism content is produced is influenced by cultural norms, such that it is influenced by local customs, traditions, and tastes, and, consequently, is more appealing and relevant (Su *et al.*, 2024).

Community Engagement

Community engagement is defined as users' participation in collaborative or interactive experiences within a social context (Anthony Jr, 2024). In VR tourism, the engaging community can be virtual tours, online events, or interactive platforms where users can share their experiences, opinions, and feedback (Go and Kang, 2023). The more social interactions a VR platform offers, such as multiplayer virtual tours or a facility to comment on or share experiences, the more it boosts a sense of belonging and collective participation. Users can connect with individuals who share similar interests in such destinations or experiences, and engage in a virtual community with them (Tayal, Rajagopal and Mahajan, 2022). This engagement will also spur the diffusion of VR tourism through the viral sharing of this technology within user networks.

Social Media Communities

Social media communities are intended to be administered and created by people, but they are also developed to share content, discuss topics of common interest, and exchange ideas. Social media communities are compelling drivers of awareness, adoption, and discussion of virtual travel experiences in VR tourism (Cheng, Fong and Law, 2021). As VR travel gains popularity, social media platforms like Facebook, Instagram, YouTube, and Twitter are becoming venues for users to share their VR travel experiences, offer recommendations, and interact with one another. VR tourism is enhanced through visualization in a social media community, which facilitates user-generated content sharing (Senyao and Ha, 2022), such as reviews and testimonials that have the potential to influence the perceptions of potential adopters. Within these communities, positive word-of-mouth or peer endorsements can be the most significant driver for the widespread acceptance of VR as a legitimate, viable, and enticing alternative for virtual travel. In addition, they serve to build virtual travel networks in which people can interact, discuss, and communicate what the world looks like, and inspire each other in the VR tourism process (Hysa, Karasek and Zdonek, 2021).

Lived Experience

The lived experience of tourism using virtual reality (VR) technology can be understood as the extent and frequency users engage with VR tourism after system adoption. It mediates between perceived ease of use, perceived Usefulness, and the outcome, i.e., satisfaction, behavioural changes, willingness to sacrifice, and destination loyalty (Alalwan, 2022). Through the lived Experience of VR, it is apparent that immersive engagement with virtual tourism experiences deepens understanding of the effect of such

virtual experiences; the more a user interacts with the virtual environment, the better they understand what virtual tourism is. This is because lived experience includes repeated and ongoing engagement with VR systems, including going to different destinations repeatedly, revisiting some places, and using VR to decide where to travel in the future (Cheng, Fong and Law, 2021). VR affects tourism in terms of frequency and depth of interaction, which confines its effects on tourism in the long term. If people interact consistently with VR technology, there would likely be an increase in satisfaction, latent effects in terms of change in behaviour toward travel, and higher loyalty for virtual destinations.

Moreover, the level of engagement has been significantly shaped by experiential and social factors acting as moderators to the Lived Experience (Mathew and Soliman, 2021). The experiential elements like entertainment, escapism, educational value, and aesthetics of VR tourism create connections with emotions and virtual experiences benefits in VR tourism. VR experiences can be highly immersive, fun, and visually engaging. It encourages users to spend more time with VR technology over time (Goel *et al.*, 2022). Sociocultural influences like the effect of social environment, customs, community participation, and social media also play a part in perpetuating involvement with VR (Khalil, Kallmuenzer and Kraus, 2024). In other words, lived experience is the primary mediating variable between two stages: initial adoption and realisation of actual outcomes, such as satisfaction, behavioural change, and destination loyalty. To realise these outcomes, VR technology must be regularly and sustained engaged with, making the lived experience a crucial factor in VR's success and long-term integration in the tourism industry (Li and Jiang, 2023).

Responses

Satisfaction with VR Experience

The degree of contentment in which users fully experience virtually meets their expectations and satisfies them with the technology (Torabi *et al.*, 2022). It includes different dimensions, such as the quality of the immersive experience, the realism of the virtual world, the tangible features of the technology, and the emotional involvement of users. Positive perceptions of VR as a valid travel tool for visiting a destination can expand consumers' willingness to suggest VR tourism to others and their likelihood of utilizing VR again (Bagheri *et al.*, 2024). Typical satisfaction drivers include the accuracy of content, interactive features, and aesthetic appeal, as users demand a smooth and immersive encounter that complements or adds to the real-world travel experience (Nam, Dutt and Baker, 2023). However, unsatisfactory experiences can inhibit the harmful adoption of VR technology.

Behavioural Changes

Behavioural changes refer to the attitudes or actions that emerge from VR tourism experiences. These changes could be modified in future travel intentions (e.g., interest in visiting a destination after experiencing it virtually) or how users work through their travel plans (Rasoolimanesh *et al.*, 2022). VR could impact travellers, enabling them to gain insight into the essence of holiday destinations, assist them in making informed

decisions, and even entice them to visit places they may not have considered. Moreover, VR tourism can promote behavioural changes by enhancing environmental responsibility or encouraging the adoption of sustainable travel practices (Irawan *et al.*, 2022). For example, seeing a virtual tour of an endangered environment or cultural heritage site may help people become more likely to engage in eco-friendly travel behaviours. As such, VR tourism can influence momentary user behaviours and long-term travel decisions (Gursoy, Malodia and Dhir, 2022).

VR Destination Loyalty

The loyalty of a VR destination refers to the degree to which users become increasingly frequent visitors to a destination after encountering it using VR technology. Unlike traditional travel experiences, VR tourism forms an emotional connection and attachment to destinations, bypassing the loyalty built through actual visits (Godovykh and Tasci, 2021). People with immersive, positive experiences with one virtual destination may be more likely to return to it or suggest it to others. Influential factors of VR destination loyalty are the virtual experience's emotional resonance, perception of the representation's authenticity, and availability of continuous updates and new features that retain a user's interest in a VR destination (Tasci *et al.*, 2022). In particular, in tourism marketing, this form of loyalty is important because it shows how VR can contribute not only to attracting potential tourists but also to guarantee that an attraction or destination can generate interest and engagement over the long term, independent of the physical travel itself (Ramesh and Jaunky, 2021).

Willingness to Sacrifice

Willingness to sacrifice refers to one's desire to eliminate their comfort or preference for the betterment of the destination. This construct is crucial for travel behaviour, especially for situations that necessarily imply compromises: group travel, trips on a budget, or sustainable tourism (Torres-Moraga, Rodriguez-Sanchez and Sancho-Esper, 2021). Tourists may forfeit the possibility of convenience, time, and personal desires to improve collective enjoyment, create social bonds, and aid in conserving a destination (Chen *et al.*, 2022). For example, in group tourism, individuals may sometimes be willing to give up personal preferences, such as where to stay or what to do, if the group's needs are fulfilled (Talwar *et al.*, 2023). Similarly, with ecotourism, tourists may sacrifice luxury or convenience to be involved in environmentally responsible behaviour that contributes to conservation efforts (de Araújo *et al.*, 2022) . As Aulet, Fernandes and Timothy (2021) argue, social norms, interaction desire, and destination loyalty affect the willingness to sacrifice. The willingness of tourists to make sacrifices augments tourists' satisfaction and tourism destination sustainability through ethical behaviour and also reduces the negative impacts of tourism.

Discussions

The suggested conceptual framework illustrates a multidimensional process of how VR technologies can be integrated into tourism. Based on a thorough review of literature and guiding theoretical frameworks (i.e., TAM, UTAUT, and DoI) as previously mentioned in the methodology section, the framework offers a comprehensive lens to evaluate the

dynamics of VR tourism, including its social, economic, and environmental implications for the global economies. Collectively, these guiding theories infuse socio-cultural values, desire for continuous innovation, and urge for technological adoption, thereby leading to immersive experiences and consequent adoption of VR tourism.

The proposed conceptual framework illustrates multidimensional process of adopting VR technologies in the field of tourism. Apart from its theoretical alignment, it also underscores the relationship between technological readiness, the engagement of stakeholders and the expected outcomes of contemporary travelers. In practice, the integration of VR in tourism can facilitate pre travelers to decide their engagement, enlighten cultural appreciations and it can help to reduce carbon footprints which can reduce environmental degradation. It may help the places which are sensitive for physical travel, culturally fragile and logistically challenging places. Moreover, the idea generated through this conceptual framework is to draw attention of stakeholders towards the potential use of VR as a tool for destination marketing. Also, it can help the individuals with various limitations including people with disabilities, elderly age issues and financial limitations. The cultural and gender barriers can also be highlighted through VR tourism.

From a policy and industry perspective, the model suggests that the successful adoption of VR tourism depends not only on technical abilities, but also on the construction of value-operated stories that echo with diverse tourist segments. Training for tourism professionals, investing in VR material development, and cross-sector cooperation between technology providers and tourism boards are required to realize the ability of framework. Finally, by bridging technological innovation with permanent tourism goals, the proposed model rapidly provides a route to the more flexible, inclusive and adaptive tourist industry in the digital and environmentally conscious era.

In addition, the framework VR highlights the importance of user experience design in shaping the perceptions and acceptance of tourism. While the principles of technical adopting such as TAM emphasizes ease of use and perceived utility, VR's immersive nature adds a sensory and emotional dimension that can strongly affect practical intentions. This means that VR tourism products should be more than technically functional-they should also give a sense of hypnotic narratives, authentic representations and appearance that closely mimics the real-world experiences. Poorly designed VR experiences can result in a user fatigue, apathy or motion disease, which may obstruct widespread adoption despite technical availability.

The socio-economic implications embedded in the framework also focus on potential inequalities in access to VR tourism. While VR can democratize travel experiences for individuals with physical or financial obstacles, it can simultaneously widen the difference between technically advanced and low-purpose sites. Infrastructure requirements, such as high -speed internet and modern VR hardware, can limit participation in some fields. Thus, justified access strategies - such as cheap VR solutions, public VR hubs, and partnership with educational institutions - are important to ensure that VR tourism develops as an inclusive rather than exclusion innovation.

Recommendations

A significant undertaking for scholars would be to shift our attention toward interdisciplinary studies that consider the integration of VR with tourism, environmental science, cultural studies, and even psychology to better understand the long-term effects of VR tourism. Accordingly, the researchers should evaluate socio-economic, cultural, and environmental impacts of VR tourism coupled with understanding its effectiveness in promoting sustainable and responsible tourism. In this regard, industry professionals can work with academics to set best practices and technical standards for tourism companies to create high-quality VR experiences that align with the sector's goals. For those who can't get to the actual places due to physical, financial, or time restraints, VR offers an immersive experience. By doing this, we can democratize tourism experiences, allowing all to explore the world virtually. The tourism industry could use VR to post more immersive and authentic advertisements with the help of potential tourists who can now experience an area before actually travelling there in person. VR offers ways to offer unique tourism experiences, like virtual guided tours, historical reenactments, or visits to remote or hard-to-reach places that contribute to additional tourist satisfaction. Tourism departments should devise policies to support the utilisation of VR technology in the tourism sector, and governments should encourage businesses to adopt these technologies through awards, tax cuts, or research funding. Investing in malls, parks, and historical places can make it one of the world's most fabulous cities. Creating a regulatory framework for the use of VR in tourism helps ensure ethical tourism that complies with the guidelines on data privacy and that the virtual experience is accurate and realistic. Potential stakeholders in the tourism industry, i.e., operators, may partner with VR technology providers to offer hybrid packages that offer virtual and physical tourism experiences. It can also bring in new revenue streams, particularly for those off-season or low-demand destinations. Content creators need to think up high-quality, immersive VR content that is informative and engaging. It will be authentic because of collaboration with local communities and cultural institutions. In VR, the concept of sustainability explains that tourism could reduce carbon footprints, resulting in less need for travel, which is a significant source of environmental impact. Virtual tourism can also afford virtual access to physically worn-out natural resources and heritage sites. By giving virtual access to historical sites and cultural experiences, VR can protect vulnerable or shrinking cultural sites from being exposed to mass tourism or environmental destruction. VR is a sustainable tourism tool that diversifies the travel market, thus driving tourists to less popular destinations and reducing overcrowding in popular tourist places. Destination marketing agents and organizations should work with local cultural experts to create VR stories that make people feel real and nostalgic. Designers need to focus on storytelling that lets individuals interact and get instant feedback. In this way, the outcomes become more valuable and interesting, fostering other countries as well to build flexible and easy-toexpand systems in the VR tourism industry.

Ethical Considerations, Limitations & Future Directions

Although the study has suggested various implications, it is yet subject to some limitations. First, the conceptual framework suggests the use of high-end VR hardware devices and associated technologies, which might make it challenging for low-income and technologically lagging economies. Second, as this study is based on conceptual

understanding that is substantiated by underlying theoretical frameworks and prior scholarly studies, the suggested framework should be empirically tested by utilising quantitative, qualitative, and mixed-method designs for meaningfully translating conceptual insights into real-world impacts. In this regard, future quantitative studies would help operationalise the proposed framework from the viewpoint of testing the relationship between the suggested variables. Moreover, the qualitative studies would assist in identifying and exploring some new antecedents, mediating, and moderating variables.

Conclusion

This study concludes that VR has become a transformative technology for the tourism industry. With immersive and interactive experiences, VR tourism has shattered the physical, geographical, and economic barriers that long kept tourists away from travel, sightseeing, and recreation. In addition to enabling virtual access to culturally, socially, environmentally, and geographically sensitive sites, it offers a sustainable alternative to mass tourism by lowering the environmental footprint of travel. It would not only ease pressure on over-touristed destinations but also enable virtual tourism for tourists with disabilities or social mobility issues, thus promoting more balanced and sustainable tourism models. This research thus recommends some actionable insights to the relevant stakeholders, such as researchers, policymakers, VR technology providers, tour operators, and tourists, encouraging them to adopt economically viable and environmentally sustainable tourism practices while contributing to the relevant SDGs at the same time. It also offers new spaces for affordable and balanced tourism, thereby signifying the use of immersive technologies to promote an overall culture of sustainable tourism, particularly in developing countries.

With the burgeoning need for innovative and immersive tourism, the stakeholders, such as tourism operators and content creators, must concentrate on creating high-quality immersive virtual experiences. This opens the scope for future interdisciplinary research on the impacts and applications of VR in tourism for researchers, academicians, and practitioners. However, more research is needed to assess the long-term effects of virtual tourism in social, cultural, and environmental situations and to set up the standards and best practices to build such lived experiences. Nevertheless, in time, VR is set to disrupt the way the tourism industry operates and deliver an accessible, environmentally sound, and immersive future for travellers from all over the world.

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Authors' Contributions (in accordance with ICMJE criteria for authorship)

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Conceived and designed the research or analysis	Yes	Yes	Yes	No
Collected the data	Yes	No	No	Yes
Contributed to data analysis and interpretation	Yes	Yes	No	No
Wrote the article/paper	Yes	Yes	No	No
Critical revision of the article/paper	No	Yes	Yes	No
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